

CLAIMS

We claim:

1. A composition comprising:

a first component that provides a predetermined response to radiation; and

a second component;

wherein upon curing of said composition portions of said first component bind together portions of said second component to form an inhomogeneous material having physical properties substantially determined by said second component.

2. The composition of Claim 1, wherein said first component is a minority component of said inhomogeneous material.

3. The composition of Claim 1, wherein said second component is a majority component of said inhomogeneous material.

4. The composition of Claim 1, wherein a ratio of a size of one of said portions of said second component to a size of one of said portions of said first component is greater than about 5.

5. The composition of Claim 4, wherein said ratio is greater than about 10.

6. The composition of Claim 1, wherein said radiation includes ultraviolet light.

7. The composition of Claim 1, wherein said predetermined response to radiation includes dissociation.

8. The composition of Claim 1, wherein said predetermined response to radiation includes polymerization.

9. The composition of Claim 1, wherein said first component comprises a photosensitive derivative of a polyhedral oligomeric silsesquioxane.

10. The composition of Claim 1, wherein said first component comprises a methacrylate substituted polyhedral oligomeric silsesquioxane.

11. The composition of Claim 1, wherein said second component comprises porous silica particles.

12. The composition of Claim 1, wherein said second component comprises silicalite particles.

13. The composition of Claim 1, further comprising a material that responds to light to initiate a polymerization reaction.

14. The composition of Claim 1, wherein said physical properties are macroscopic physical properties.

15. The composition of Claim 14, wherein said macroscopic physical properties include a dielectric constant of said inhomogeneous material

16. The composition of Claim 1, wherein said inhomogeneous material has a dielectric constant less than about 2.6.

17. A composition comprising:
porous silica particles; and
a photosensitive binder component;
wherein upon curing of said composition said binder component binds said porous silica particles to each other to form a porous silica matrix.

18. The composition of Claim 17, wherein said porous silica particles comprise silicalite crystals.

19. The composition of Claim 17, wherein said photosensitive binder component comprises a photosensitive derivative of a polyhedral oligomeric silsesquioxane.

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20. The composition of Claim 17, wherein said composition is curable by photoexcitation of said photosensitive binder component.

21. The composition of Claim 17, wherein said porous silica matrix has a dielectric constant less than about 2.6.

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22. A method of forming a patterned insulating layer on a substrate, said method comprising:

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depositing photosensitive binders and porous silica particles on said substrate; and

exposing said photosensitive binders and said porous silica particles to a radiation pattern.

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23. The method of Claim 22, further comprising removing from said substrate porous silica particles not exposed to said radiation.

24. The method of Claim 22, further comprising removing from said substrate porous silica particles exposed to said radiation.

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25. The method of Claim 22, wherein said porous silica particles comprise silicalite crystals.

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26. The method of Claim 22, wherein said photosensitive binders comprise a photosensitive derivative of a polyhedral oligomeric silsesquioxane.

27. The method of Claim 22, wherein said radiation pattern defines a via in a metal interconnect level in an integrated circuit.

28. The method of Claim 22, wherein said radiation pattern defines a trench in a metal interconnect level in an integrated circuit.

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